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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,547	11/21/2003	Takehiko Makita	31869-198826	7976

26694 7590 11/25/2005

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EXAMINER	
DEO, DUY VU NGUYEN	
ART UNIT	**PAPER NUMBER**
1765	

DATE MAILED: 11/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/717,547	MAKITA ET AL.	
	Examiner	Art Unit	
	DuyVu n. Deo	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3, 5, 6, 8, 10, 11, 13, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Moustaka (US 5,847,397).

Admitted prior art, pages 1-3 of the specification, describes a method for forming HEMTs comprising: removing part of GaN (second compound semiconductor) by dry etching to partially expose a surface of the AlGaN. Unlike claimed invention, admitted prior art doesn't describe nitrogen plasma treatment step to recover damage due to nitrogen vacancies arising in the expose AlGaN surface. Moustakas teaches a surface treatment method for a compound semiconductor comprising treating the surface with a non-etching nitrogen plasma to reduce the formation of nitrogen vacancies (claimed recover from the damage due to nitrogen vacancies arising in a surface of the compound semiconductor) (col. 5, line 39-48). It would have been obvious for one skilled in the art in light of Moustaka to treat the compound semiconductor with N2 plasma because it reduces the formation of nitrogen vacancies (col. 5, line 39-48), which is a problem recognized by one skilled in the art at the time of the invention (page 3 of the specification).

Referring to claim 10, the conventional method for forming HEMTs further comprises: forming the AlGan layer on a substrate and a GaN layer on the AlGan layer; forming a first and second main electrode on the AlGan layer; annealing the partially exposed AlGan layer; and forming a gate electrode on the exposed AlGaN (page 2 of the specification).

3. Claims 2, 7, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior and Moustaka as applied to claims 1, 5, 10 above, and further in view of Lee et al. (US 6,762,083).

Referring to claims 2, 7, 12, Moustakas doesn't describe a plasma treatment for the compound semiconductor using a ICP (claimed ICP RIE) (col. 2, line 39-45). It would have been obvious for one skilled in the art to any apparatus that are available and known in the art as shown here by Lee as long as it can provide a plasma for the treatment process with a reasonable expectation of success.

4. Claims 4, 9, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Moustaka as applied to claims 1, 5, 10 above, and further in view of Gilbert et al. (US 2002/0072223).

Referring to claims 4, 9, 14, cleaning semiconductor with pure water is known to one skilled in the art in the process manufacturing device as shown here by Gilbert in order to remove contamination on the wafer (paragraph [0045]).

Response to Arguments

5. From the applicant's remark, it appears that the main argument is that whether Moustaka's nitrogen plasma treatment might be useful for recovering the damage from the nitrogen vacancies, as a result of dry etching.

Moustaka might not teaching that the nitrogen vacancies is a results of dry etching. However, this problem is well recognized by one skilled in the art as shown in pages 1-3 of the specification. Therefore, at the time of the invention, it is obvious that the nitrogen vacancies can be formed from dry etching. And since Moustakas teaches method for reducing (or claimed recovering nitrogen vacancies) of the nitrogen vacancies. One skilled in the art would find it obvious to apply Moustakas in order to reduce nitrogen vacancies, and therefore, the damage or problems associated or due to nitrogen vacancies would also be recovered.

Also, applying Moustakas technique to any process where this problem occurs would be obvious to one skilled in the art at the time of the invention in order to solve the problem of nitrogen vacancies and the damage associated with the nitrogen vacancies.

Referring to applicant's arguments (paragraphs 4-6) about the deficiencies of Moustakas, Lee and Gilbert, In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6:00-2:30 Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Primary Examiner
Duy-Vu N. Deo
11/22/05